Visualizing Perspectives for Creative Collaboration

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ABSTRACT
Every day, more and more data is collected, and we are increasingly being provided with open access to it. The hope is that this will be the driving force behind a wave of innovative new businesses that are able to lead us out of our current financial problems and give rise to a generation of better informed, active consumers who will engage with the kind of changes necessary to reduce global warming and prevent a pensions crisis. However it is not enough to simply release this data, people must also be given the tools to understand and engage with it creatively. The research presented here draws together current approaches from data visualization, creativity research and human-computer interaction to provide a framework in which personal data stories can be used to present a range of perspectives and support collaboration between people with different experiences and varying levels of domain expertise.

Author Keywords
Data visualization, creativity support, user engagement

ACM Classification Keywords
H.5.m. Miscellaneous.

INTRODUCTION
That we live in the Information Age has become something of a truism. However, the value created through understanding data is clearly demonstrated in the ongoing success of Google and the IPO valuation of Facebook. It is further evidenced by the impact of the Open Data movement and in the UK government's recently announced *midata* initiative, whereby companies are being encouraged to release personal data back to their customers in secure, portable, electronic formats. The hope is, that through such initiatives, innovative new businesses can be built that will power the knowledge economy and lead us out of the current economic difficulties. Furthermore, it is also hoped that this will encourage consumers in areas such as energy provision, telecoms and financial services to become more active and be better informed. However, it is not sufficient to simply make data available, people must also be given the tools, confidence and motivation to engage with it creatively.

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This research aims to support these objectives by enabling people to share their personal perspectives and visualize data not simply to provide an accurate representation, but also as a platform for argument and discussion, for storytelling and scenario testing.

RESEARCH OBJECTIVES
The overall objective of this research is to study the effectiveness of using data visualization techniques as tools for supporting creativity and engagement. Firstly, as a platform to share perspectives within service design workshops and secondly to encourage and enable everyday creativity in the public. Through it, I aim to address the following questions:

- Can data visualization tools effectively support different experts in sharing their domain specific knowledge?
- Does the introduction of data visualization tools increase the number and value of ideas generated in a collaborative design workshop?
- Do data visualization techniques effectively engage lay audiences?
- Do personal data stories, which present individual perspectives, support users in gaining and sharing insight?

RELATED WORK

Information Visualization
Two current perspectives within the Information Visualization community, *narrative visualization* [1, 2] and *social data analysis* [3, 4] provide the background to this research and are covered below. In addition, Isenberg et al [5] provide a review of *collaborative visualization* that will inform its implementation.

Narrative Visualization
Whilst storytelling has long been a part of successful data visualization, e.g. Minard's famous map representing the catastrophic loss of troops during Napoleon's ill fated Russian campaign [6], the rise in data journalism [e.g. 7, 8] has seen a renewed focus on this communicative aspect. Segel and Heer [1] present a review in which they describe different visual and interactive devices that support storytelling to communicate insight. Hullman & Diakopoulos [2] demonstrate how technique selection and design tactics influence user interpretation of the original data, thus delivering the author's perspective. This they term *visualization rhetoric*. Such techniques could be used positively and inclusively to enable individual users to

present their own perspectives, promote engagement and encourage creative responses to data.

Social Data Analysis

Research into social data analysis, using online resources e.g. Many Eyes [3] and NameVoyager [4], has investigated how visualization technology can be democratized. Similar work with collaborative visual analytics [9, 10] investigates factors supporting awareness of others, establishing common ground and insight sharing. This work suggests there are both opportunities and also potential difficulties in reaching an audience that, whilst motivated, may be inexperienced with visualization tools.

Collaborative Creativity Research

Fischer et al [11] have adopted Star's [12] term *boundary object* to describe the kind of shared externalizations that they have created to provide a platform that allows members of *Communities of Interest* to share differing domain expertise and make tacit knowledge explicit. This is a role I believe interactive visualization tools are well suited to as they offer the opportunity to reflect different perspectives on aspects of the same data. This role will be important in engaging the wider public as well as during the design workshops.

APPROACH

This research will involve the iterative design and evaluation of prototype systems which enable users to create and share visualizations reflecting their perspective on a dataset and forming generative inputs in collaborative design workshops. This will be based on a user-centred design philosophy and a distributed cognition approach to human-computer interactions. The content and design of these prototype systems will be based on the requirements of specific case studies. The lessons learned from each case study will be fed into any subsequent research with the ultimate aim of providing a set of useful design criteria.

STATUS OF THE RESEARCH

A case study with a major energy provider is to be undertaken, starting March 2012 and lasting for ten months. This will investigate ways to engage customers with energy data and smart home and smart meter technology. Work will be undertaken to visualize existing data, both for customer profiling and consumption awareness. These visualizations will be used by staff and customers within collaborative service design workshops to investigate touch points through which the benefits of smart metering and energy conservation can be effectively visualized and communicated to customers.

CONTRIBUTIONS

This research will bring together current work within the data visualization, creativity research and human-computer interaction communities in order to investigate the increasingly important question of engaging a lay audience with complex data. This will lead to guidelines for more effective communication and insight sharing. In addition, I aim to show how visualization tools can act as boundary objects, representing different perspectives and supporting the domain specific knowledge and experience of participants in collaborative work.

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